

MATH 1100
COMMON FINAL EXAMINATION
FALL, 1996

Please make sure that your name and student identification number appear on the answer sheet in the space provided for this purpose.

This exam consists of 30 multiple choice questions. Read the questions carefully. You must use a pencil with soft black lead (#2 or HB) to complete the answer sheet. If you mark two or more answers corresponding to a single problem, then that problem is counted as incorrect. **YOU ARE NOT PENALIZED FOR GUESSING.** You may write in your test booklet, but you only receive credit for properly marking the answer sheet.

1. If $g(s) = s^2 - 2s$ then $g(2x)$ equals
 - (a) $4x^2 - 4x$
 - (b) $(s^2 - 2s) \cdot 2x$
 - (c) $2x^2 - 4x$
 - (d) 0
 - (e) None of these

2. Which of the following functions is an odd function?
 - (a) $f(x) = 2x - 1$
 - (b) $f(x) = x^2$
 - (c) $f(x) = 2x^3 - 5x$
 - (d) $f(x) = \frac{2x}{x - 1}$
 - (e) None of these

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3. The graph of the function $f(x) = x^2 + 8x - 11$ is
- (a) a circle with radius $\sqrt{11}$
 - (b) a parabola with vertex $(4, 27)$
 - (c) a parabola which opens downward
 - (d) a hyperbola
 - (e) None of these
4. The quadratic function whose graph has vertex $(2, -3)$ and passes through the point $(-1, 1)$ is
- (a) $-\frac{1}{16}x^2 + \frac{3}{8}x + \frac{23}{16}$
 - (b) $4x^2 + 16x + 13$
 - (c) $2x^2 - 3x - 4$
 - (d) $\frac{4}{9}x^2 - \frac{16}{9}x - \frac{11}{9}$
 - (e) None of these
5. Using absolute value notation, the distance between x and 4 is more than 6 can be written as
- (a) $|x + 4| \geq 6$
 - (b) $|x - 4| < 6$
 - (c) $|x - 6| < 4$
 - (d) $|x + 4| < 6$
 - (e) $|x - 4| > 6$

6. Completely factor the expression $3x^3 - 15x^2 + 12x$.

(a) $3(x^3 - 5x^2 + 4x)$

(b) $3x(x^2 - 5x + 4)$

(c) $x = 1$, $x = 4$ and $x = 0$

(d) $3x(x - 1)(x - 4)$

(e) $x = 1$ and $x = 4$

7. Simplify the complex fraction

$$\frac{\left(\frac{x}{3} + 2\right)}{x + 2}.$$

(a) $\frac{x + 1}{3x + 1}$

(b) $\frac{x^2 + 5x + 6}{3}$

(c) $\frac{x + 6}{3x + 6}$

(d) $\frac{x+2}{3x+2}$

(e) $\frac{x+6}{3x+2}$

8. Simplify the complex fraction

$$\frac{\left(\frac{(4x)^2}{3}\right)}{\left(\frac{2x}{5}\right)}.$$

(a) $\frac{40x}{3}$

(b) $\frac{32x^3}{15}$

(c) $\frac{8x^3}{15}$

(d) $\frac{20x}{3}$

(e) $\frac{10x}{3}$

9. Evaluate $(-\frac{8}{27})^{-1/3}$.

(a) $-\frac{2}{3}$

(b) $-\frac{5103}{256}$

(c) $\frac{3}{2}$

(d) $\frac{2}{3}$

(e) $-\frac{3}{2}$

10. Which of the following equations might have the following graph?

(a) $f(x) = x^4 - 3x^2 + 2$

(b) $f(x) = x^3 - 3x^2 + 2$

(c) $f(x) = x^2 - 3x^2 + 2$

(d) $f(x) = 3x + 2$

(e) None of these

11. The graph of the function $y = \frac{2x + 3}{3x - 4}$

(a) has the vertical asymptote $x = \frac{3}{4}$

(b) has the vertical asymptotes $x = \frac{4}{3}$ and $x = -\frac{3}{2}$

(c) has not vertical asymptotes

(d) has the vertical asymptote $x = -\frac{3}{2}$

(e) has the vertical asymptote $x = \frac{4}{3}$

12. The solution of the system of linear equations

$$\begin{aligned}4x + 3y &= 7 \\8x + y &= -1\end{aligned}$$

is

- (a) $x = 1, y = 1$
 - (b) $x = 0, y = 1$
 - (c) $x = \frac{1}{2}, y = \frac{7}{3}$
 - (d) $x = \frac{1}{2}, y = -5$
 - (e) $x = -\frac{1}{2}, y = 3$
13. The system of linear equations

$$\begin{aligned}-2x + 3y &= 5 \\6x - 9y &= -15\end{aligned}$$

has

- (a) exactly one solution
 - (b) exactly two solutions
 - (c) no solutions
 - (d) infinitely many solutions
 - (e) None of these
14. The straight line $x + 2y = 20$ and the circle $x^2 + y^2 = 100$
- (a) intersect at $(0, 10)$ and $(8, 6)$
 - (b) intersect at $(0, 10)$ only
 - (c) do not intersect
 - (d) intersect at $(-6, 8)$ and $(8, 6)$
 - (e) None of these

15. Solve $x^2 - x = 2$.

(a) $x = 3, x = -1$

(b) $x = -1, x = 2$

(c) $x = 1, x = -2$

(d) $x = \frac{1}{3}$

(e) None of these

16. Solve $\sqrt{x+1} - x = 1$.

(a) $x = 1, x = 0$

(b) $x = -1, x = -2$

(c) $x = 0, x = -1$

(d) $x = 2$

(e) None of these

17. The solution set for the inequality $\frac{x+2}{2x-1} \geq 1$ is completely described by

(a) $\frac{1}{2} < x \leq 3$

(b) $\frac{1}{2} \leq x \leq 3$

(c) $-2 \leq x < \frac{1}{2}$

(d) $x \leq 3$

(e) None of these

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18. Which of the following is a positive solution of $e^{2x} - 4e^x + 3 = 0$?
- (a) 0
 - (b) $\ln 2$
 - (c) $\ln 3$
 - (d) 1
 - (e) 3
19. To the nearest year, how long does it take an investment of 6% annual rate and compounded semi-annually (that is, twice a year) to triple?
- (a) 16
 - (b) 17
 - (c) 18
 - (d) 19
 - (e) 20
20. Which of the following does not belong to the domain of the function $y = \ln(|2 + x| - 1)$?
- (a) -4
 - (b) -2
 - (c) 0
 - (d) 2
 - (e) 4.4

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21. Given that $\log_b 2 \approx 0.356$, $\log_b 3 \approx 0.566$, $\log_b 5 \approx 0.827$, which of the following is closest to $\log_b 3000$?
- (a) 3.83
 - (b) 4.01
 - (c) 4.12
 - (d) 4.25
 - (e) 17.03
22. What is the distance from $(2, 3)$ to $(5, 2)$?
- (a) $\sqrt{17}$
 - (b) $\sqrt{15}$
 - (c) $\sqrt{14}$
 - (d) $\sqrt{13}$
 - (e) $\sqrt{10}$
23. The center of the circle $x^2 + y^2 + 2x - 4y - 15 = 0$ is
- (a) $(1, -2)$
 - (b) $(-1, 2)$
 - (c) $(2, 1)$
 - (d) $(-2, 1)$
 - (e) $(-2, -1)$

24. What is the equation of the line containing $(2, -3)$ and parallel to $2x + y - 6 = 0$.

(a) $y = -2x + 1$

(b) $2y = -2x - 2$

(c) $y = 2x - 7$

(d) $y = 3x - 9$

(e) $y = 4x - 11$

25. What is the coefficient of x^6 in the expansion $(x + 3)^{10}$

(a) 17,120

(b) 17,100

(c) 17,010

(d) 17,020

(e) 17,030

26. How many three-letter words can be made from 26 letters if no letter can be used no more than one time

(a) 15,650

(b) 15,700

(c) 15,625

(d) 15,800

(e) 15,600

27. Five of fifteen phones are defective. If 1 phone is selected at random, what is the probability it is defective?

- (a) $\frac{1}{4}$
- (b) $\frac{1}{3}$
- (c) $\frac{1}{2}$
- (d) $\frac{1}{6}$
- (e) $\frac{1}{10}$

28. Five of fifteen phones are defective. If 3 phones are selected, what is the probability that at least two are defective?

- (a) $\frac{150}{1140}$
- (b) $\frac{149}{1140}$
- (c) $\frac{148}{1140}$
- (d) $\frac{146}{1140}$
- (e) $\frac{145}{1140}$

29. Find the solutions of the equation $|x + 1| = 3$.

- (a) $x = 1, x = 4$
- (b) $x = \frac{1}{2}, x = 2$
- (c) $x = 2, x = -4$
- (d) $x = 2$
- (e) None of these

30. Find the domain of the expression $\sqrt{1 - x^2}$.

- (a) $-1 \leq x \leq 1$
- (b) $0 < x \leq 1$
- (c) $x < -1$ or $x > 1$
- (d) $x \geq 0$
- (e) None of these

END OF MATH 1100 EXAM